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U. S. DEPARTMENT OF AGRICULTURE.

REPORT

OF THE

Chief of the Division of Biological Survey

FOR

1897.

BY

C. HART MERRIAM.

[From the Report of the Secretary of Agriculture.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
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REPORT OF THE CHIEF OF THE DIVISION OF BIOLOGICAL SURVEY.

U. S. DEPARTMENT OF AGRICULTURE,
DIVISION OF BIOLOGICAL SURVEY,
Washington, D. C., June 30, 1897.

SIR: I have the honor to submit herewith a report of the doings of the Biological Survey for the fiscal year ending June 30, 1897.

Respectfully,

C. HART MERRIAM, *Chief.*

Hon. JAMES WILSON, *Secretary.*

WORK OF THE YEAR.

Two principal lines of work are carried on by the Biological Survey—a study of the geographic distribution of animals and plants, with a view to determining the boundaries of the natural life zones and their subdivisions, and a study of the food habits of birds and mammals—for the purpose of ascertaining the economic relations of our native species. Work along both of these lines has been continued.

GEOGRAPHIC DISTRIBUTION.

During the fiscal year ending June 30, 1897, field work has been done in Washington, Oregon, California, Nevada, Utah, Wyoming, Nebraska, Kansas, Indian Territory, West Virginia, Mexico, and western Canada.

A special effort has been made to ascertain the boundaries of the life zones of the various species of plants and animals in the northwestern corner of the United States, particularly in Oregon and Washington. During the summer of 1896 the Biological Survey had three field parties in Oregon, working under my personal supervision; and at the present time (June 30, 1897) we have four parties in Washington. It is hoped that by the end of the season enough material will be collected to admit of mapping the life zones of these two States with as much detail as the present base maps permit. In this connection it may be remarked that the need of better topographic maps is nowhere more keenly felt than in the work of the Biological Survey. The absence of such base maps renders it impossible, in areas aggregating many hundreds of thousands of square miles, to plat the distribution of animals and plants with any accuracy.

CEREAL INVESTIGATION.

Early in the year plans were made for undertaking a series of investigations which had long been contemplated, with a view to rendering

the results of previous studies on geographic distribution immediately available for practical agriculturists. The first investigation of the kind had for its object the determination of the varieties of corn, wheat, and oats which could be most profitably cultivated in each of the natural life zones of the United States, and was intrusted to Prof. C. S. Plumb, director of the Agricultural Experiment Station at Lafayette, Ind. Information respecting the different varieties of cereals was collected from more than 1,000 grain growers, located in all of the States of the Union and in several of the Canadian provinces. The tabulation of the data has been made by Professor Plumb, who has submitted a preliminary report, accompanied by maps, showing in detail the areas or belts in which some thirty varieties of corn, wheat, and oats are now grown with success. This report demonstrates in a most gratifying manner the fact that areas of successful cultivation of particular varieties of cereals conform in the main to the boundaries of the natural life zones and their subdivisions. Professor Plumb's report is now ready for publication and will be issued in the near future.

LABORATORY WORK.

Studies of the economic relations of various mammals and birds have been continued during the year, and special efforts have been made to obtain a sufficient number of birds' stomachs to complete the investigations already begun on the food of certain species. More than 3,000 birds' stomachs have been added to the collection, and 2,342 have been examined. The species now being studied include mainly flycatchers, sparrows, bobolinks, cowbirds, red-shouldered and yellow-headed blackbirds, shrikes, and blue jays. A report on the blue jay was completed and published in the Yearbook for 1896. The investigations on the shrikes, blackbirds, and flycatchers have been practically completed, and the results are now being put in shape for publication. An abstract of the reports on these and other species previously studied in the laboratory, about thirty in all, was published as Farmers' Bulletin No. 54, to meet an unusual demand for information concerning the food habits of native birds.

The stomachs examined in the laboratory during the twelve months ending June 30, 1897, may be grouped as follows:

Sparrows	1,440
Blackbirds	531
Flycatchers	257
Thrushes	79
Swallows	22
Miscellaneous	13
Total	2,342

IDENTIFICATION OF SPECIMENS.

As in previous years, thousands of specimens have been sent to the division for identification. This incidental phase of the work has grown to considerable proportions, and is believed to be of much educational value, tending to a wider diffusion of knowledge of our native species.

NASHVILLE EXPOSITION.

An exhibit illustrating the work of the division was prepared for the Tennessee Centennial Exposition at Nashville, but owing to lack

of funds it was found necessary to utilize mainly the material which had been exhibited the previous year at Atlanta. Groups of characteristic mammals and birds of the South, and species which are specially injurious or beneficial to agriculture, were shown, and the specimens were supplemented by maps and photographs, the whole exhibit being designed to illustrate the more important facts of geographic distribution and the food habits of certain species of economic importance. During the past few years the division has been called upon to arrange exhibits for four expositions. The preparation, installation, and repacking of material for such exhibits not only consumes a large amount of time which can ill be spared from other work, but requires the services of the most intelligent and skillful assistants, thus proving a serious loss to the division.

PUBLICATIONS.

In addition to a Farmers' Bulletin on birds and a paper on the food of the blue jay an article on "Extermination of noxious animals by bounties" was published in the Yearbook for 1896, and a circular on Bird Day in the Schools was prepared and distributed among teachers and school superintendents. A technical paper on the family of bats, to which nearly all the North American species belong, has been completed by Mr. Gerrit S. Miller, jr., a former assistant, and will appear as North American Fauna No. 13.

The main object of the work of the division being to collect and disseminate information regarding the geographic distribution and food habits of mammals and birds, particularly those of economic importance, provision should be made for the publication of larger editions of the various reports. During the past year there has been an unusual call for information on birds, and hundreds of requests have been received for publications for the use of teachers in the public schools. At present the only way to meet such demands is by circulars or by Farmers' Bulletins. As a rule, requests for other bulletins can not be granted, because the number of copies ordinarily printed is entirely too small to meet the demand. It would seem wise to provide more generously for the distribution of reports which are designed for purposes of instruction, particularly those sought by teachers in the schools and colleges.

BIRD DAY IN THE SCHOOLS.

One of the most promising methods of popularizing bird study was suggested three years ago by Prof. C. A. Babcock, of Oil City, Pa., who proposed to set apart one day in the school year for the purpose of instructing the pupils regarding birds. This suggestion, which seemed both feasible and practical, was heartily indorsed by the Department. A circular was prepared, setting forth the objects of Bird Day and the importance of birds to agriculture, and more than 15,000 copies were distributed during the year—mainly to teachers and superintendents of schools. In Wisconsin a law was enacted combining Bird Day with Arbor Day, and on April 30, 1897, in accordance with the proclamation of the governor, suitable exercises were held in the schools throughout the State. In Arkansas, Illinois, Nebraska, and Iowa efforts to secure a general recognition of the day met with much encouragement, and all the reports thus far received indicate that Bird Day was a success wherever observed. Enough has already been accomplished to dem-

onstrate the possibility of making the public schools a potent factor in the dissemination of information regarding birds and bird protection.

ROUTINE WORK.

Routine work continues to consume a large part of the time of the office force. The number of letters received during the year was about 4,400, and many of them were accompanied by schedules, reports, and notes, which were examined and filed for future reference. Much of this correspondence consists of inquiries concerning reports of the division, or publications on mammals and birds in general, which can be answered in part by circulars, but the majority of the letters require special replies, often necessitating the expenditure of considerable time in looking up data. About 2,700 letters were written and several hundred schedules distributed to correspondents; about 300 packages were received and 900 sent out. Other regular work consists in the tabulation and arrangement of reports and information received from field naturalists and others, the identification of specimens, the care of collections, attention to the needs of field naturalists, the preparation of reports and bulletins for publication, and of reference lists useful in the work of the division.

OUTLINE OF FUTURE WORK.

PLANS FOR THE FISCAL YEAR ENDING JUNE 30, 1898.

The plans for the fiscal year 1897–98 contemplate the continuance of work along lines already begun. A revised edition of the Biogeographic map of North America, showing the boundaries of the life zones as corrected to the end of 1897, will be issued. The preliminary biological survey of Oregon and Washington, now well under way, will be completed and the report prepared for publication, and it is expected that additional work will be undertaken in Nevada and California. A report on the distribution of cereals, by Prof. C. S. Plumb, will be published at an early date, and, if possible, similar investigations on other crops will be undertaken. It is planned to continue in the field and laboratory the study of the distribution and food habits of the various kinds of mammals and birds, and if the fund admits, cooperative work may be begun in one or more States in connection with the State experiment stations or other agencies.

Extended investigations have been made on several groups of mammals and birds of economic importance, such as the ground squirrels, kangaroo rats, flycatchers, blackbirds, sparrows, and others, and it is expected that most of these studies will be completed during the next year and the results arranged for publication.

PLANS FOR THE FISCAL YEAR ENDING JUNE 30, 1899.

The preliminary study of the principal features of the geographic distribution of animals and plants in the United States has been nearly completed, and a revised edition of the map showing the natural life zones or agricultural belts of North America will be ready for publication in a few months. Future editions should be issued as corrections in details accumulate. In addition to this map, there is an urgent demand for a large scale faunal map of the United States. Numerous requests for such a map have already been received, not

only from practical agriculturists, but also from teachers who need it for purposes of instruction. Maps showing the distribution of particular animals, birds, trees, and crops are also in demand, but can not be supplied until the collection of the necessary data has been completed, tabulated, and platted. These requests all point to the urgent need for increased funds which can be devoted to this work. During the eight years since the study of geographic distribution was begun by the division, the principles governing the distribution of life in America have been discovered, the laws of temperature control have been formulated, and the boundaries of the various zones have been run with approximate accuracy. The work remaining to be done relates mainly to the more exact location of the boundary lines of the zones and their subdivisions and the actual coordination of the crop belts with the life zones. Under the latter head an exceedingly important piece of work has just been completed by Prof. C. S. Plumb, relating to the distribution of cereals in the United States. (See p. 16.)

The Biological Survey aims to define and map the life zones of North America and their subdivisions, to publish lists of the native or indigenous species characteristic of each, and lists of the agricultural products to which each is fitted. This involves a comprehensive study of the distribution of life with reference to the adaptability of the various parts of our domain to different agricultural and horticultural products—not only those now cultivated in this country, but also those which from their importance in other lands are likely to prove of value if introduced on fit soils and under proper climatic conditions.

In studying the geographic distribution of animals and plants, the first step is the accurate determination of the species whose distribution is to be mapped. In many groups this has been already done, so that the work of mapping is comparatively easy; but in other groups the species have not yet been defined and revisionary studies must precede the mapping. Such studies of mammals have been carried on in the division for nearly ten years and the results published in North American Fauna. It is gratifying to be able to state that the number of groups still unworked is small. When these have been "revised," it will be possible to continue the series of faunal papers begun in Nos. 3, 5, and 7 of North American Fauna. Such papers, treating of the natural history of particular States and Territories, have a high educational value. A considerable amount of work of this character is already far advanced, and its publication may be begun in the near future.

During the year just passed, propositions to cooperate with State agencies (usually experiment stations or colleges) in making State biological surveys have been received from no less than five States in the West and South. Important and desirable as such cooperation would be, the appropriation for the coming year is too small to permit it. It is hoped, however, that the appropriation for the year ending June 30, 1899, will provide for work of this kind.

It is planned to continue the economic studies of the food habits of birds and mammals as heretofore.

The appropriation now available for biological investigations is barely sufficient to carry on work already begun, and will not admit of taking up new lines of study, however important. The present lump fund of $17,500 was fixed several years ago when the Biological Survey was but an incidental feature of the investigations intrusted

to the Division of Ornithology and Mammalogy. With the change of name, increased prominence has been given to this phase of the work, and much more attention should be given to it.

A comprehensive study of the life zones along the southern border of the United States must include an investigation of the fauna and flora of certain parts of Mexico and tropical America. As is well known, this region is unusually rich and varied in indigenous animal and plant life, and also in certain agricultural products which might be introduced with profit into the United States. I am therefore led to renew the recommendation made in my last annual report, that an addition of $5,000 be made to the lump fund for biological investigations. This small addition would enable the division (1) to increase the work on geographic distribution; (2) to undertake cooperative State biological surveys; and (3) to continue investigations on the fauna and flora of tropical America.